PARALYSIS AGITANS: SOME CLINICAL OBSERVATIONS BASED ON THE STUDY OF 219 CASES SEEN AT THE CLINIC OF PROFESSOR M. ALLEN STARR.

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Since the year 1888 there have been examined and recorded in the neurological clinic of Prof. M. Allen Starr, of New York, 219 cases of paralysis agitans. Of this number about one-third have been seen and personally examined by the present writer.

The number of cases exceeds very much any similar series[1] known to the writer, and as such has a statistical value which may help to elucidate some facts in regard to this syndrome, so obscure as to its etiology and pathology.

In drawing conclusions from this material, several facts should be borne in mind. While the series includes patients of many occupations, the majority came from the humbler walks of life, thus differing from the patients seen in private practice. Observations were rarely made on cases in the advanced paralytic stages as ambulatory patients only were able to present themselves for treatment. The dispensary patient is notably unsatisfactory for prolonged observation, as but few of those suffering from chronic disorders are regular in their attendance or can carry out the hygienic measures so important in treating maladies of the type under discussion.

ANTECEDENTS AND CASUAL FACTORS.

Paralysis agitans is nearly twice as frequent among men as among women. Gowers found five men to three women. Of our 219 cases 139 were men and 80 were women, about seven men to four women. The disease rarely makes its appearance before the thirtieth year. Lannois reports one at nineteen, Berger one at seventeen, Buzzard one at twenty-one, and Huchard one in a child of three years. Of our cases, the earliest onset was in a male, twenty-two years old; the latest was in a man seventy-eight years old. Of the women, the youngest was thirty-three and the oldest seventy-two when the disease commenced. Forty per cent. began in the decade between fifty and sixty, 25 per cent. began between forty and fifty; 20 per cent. between sixty and seventy; nine cases first appeared in subjects above 70 years of age.

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[1] Gowers' observations in the last edition of his book are based on the study of 115 cases seen in private and hospital practice.

Age of onset	Under 30	30-40	40-50	50-60	60-70	Over 70	Unrecorded	Total
Male	2	10	38	49	30	5	5	139
Female	0	9	16	39	12	4	0	80
Totals	2	19	54	88	42	9	5	219

Paralysis agitans, therefore, belongs not strictly to old age, but rather to the presenile degenerative period.

The civil condition, as determined by our data, was as follows:

Civil Condition	Married	Widowed	Single	Unrecorded	Totals
Male	90	12	9	28	139
Female	31	20	8	21	80
Totals	121	32	17	49	219

As far as we can determine, occupation seems to have no bearing on the question of etiology. The annexed table shows a list of the occupations of the patients of our series.

Direct hereditary transmission can rarely be traced. In only 15 per cent. of Gowers' series, could such an influence be found. In only 16 per cent. of our cases could paralysis agitans be found to have existed in relatives, as follows: in mothers, six times; father, three; sister, three; brother, one, and cousin, one. Wollenberg found that in 26 per cent. of his cases there was some heredity taint of nervous disease. Collins and Muskens found direct heredity in four, and indirect heredity in four additional cases in the study of nineteen cases in which the heredity could be satisfactorily studied. Berger reports a case in which the father and grandfather on the father's side had shaking palsy, and of four children, two sons had an incurable chorea, with epilepsy. Borgherini lays considerable stress on heredity, and reports a family in which, of nine children, three brothers and four sisters, and three children of these, suffered from paralysis agitans. Gowers reports a sister of a case as afflicted with shaking palsy; another in which the mother had the disease, and a third in which a brother had a progressive tremor during his whole life.

MALES.

Drivers	7	Engineers	6	Band maker	1
Soldiers	1	Firemen	1	Telegraphers	1
Sailors	2	Masons	2	Preachers	2
Messengers	1	Carpenters	8	Tailors	10
Gatemen	2	Plasterers	1	Shoemakers	6
Watchmen	3	Merchants	7	Furriers	1
Postman	1	Schoolteachers	2	Janitors	2
Gardeners	2	Cooper	1	Waiter	1
Stablemen	2	Cigar makers	1	Housework	4
Peddlers	3	Factory	5	Salesmen	8
Laborers	21	Polishers	2	Clerks	4
Iron workers	4	Compositor	2	Actors	1
Blacksmiths	2	Carver	1	Unrecorded	7
		Rope maker	1		

FEMALES.

Housewives	46	Cook	1	Unrecorded	4
Nurses	2	None	12	Music teachers	2
Seamstresses	7	Laundresses	4	Store keeper	1
		Ladies' maid	1		

Other diseases noted in the parents of our patients were alcoholism in five instances; paralysis, two; neurotic, 2; rheumatism, one; phthisis, one.

The exciting causes, as assigned by the patients themselves were:

Emotion (anxiety, worry, fright)	40
Overwork	14
Trauma	31
Exposure	11
Acute disease (grippe, malaria, typhoid, pneumonia)	12
Chronic disease (rheumatism 4, syphilis 2)	6
Habits (alcoholism 7, tea and coffee 3)	10
Poisoning (lead 1, carbolic acid 1)	2
Menopause 1. Confinement 1	2
Sunstroke, insomnia, abscess, piano-playing, (each 1)	4
Unassigned	87
Total	219

The factors which stand out prominently here are those of emotion and traumatism. Among the emotional antecedents are included anxiety, shock, sorrow, grief, severe fright. A few instances may be quoted. An illicit distiller had his plant confiscated by United States officials; worry due to severe illness of mother; a drunken son; loss of children; shock following drowning of husband; frightened by lightning, tremor appeared first in eyeball and eyelid, later became general. These are sufficiently numerous to warrant us in considering them as having a real bearing on the development of the disease. Traumatism often involves an emotional shock, and it is possible that emotion may be the more important factor in many of these cases.

Physical injury is so frequently and closely associated with the onset of paralysis agitans as to impress us with its importance as a casual factor in many cases. Walz collected twenty-seven cases in which trauma had an undoubted antecedent relationship, and twenty-seven other cases which apparently, but less distinctly, had a similar cause. These include observations by Westphal, Charcot, Grawitz and others. As instances of a direct traumatic antecedent, the following may be cited from our records: Left shoulder injured in a runaway; soon after tremor began in left arm. Amputation of finger of left hand; tremor in this hand immediately followed; then extension to the other extremities was rapid. Amputation of right thumb; tremor soon commenced in right hand. Injury to lumbar region of back; tremor of both legs followed in a short time. Broke right wrist; three years later tremor appeared in right hand. Cellulitis of right hand; tremor of same hand immediately followed. Fell from wagon and dragged 100 feet. Fracture of right leg; tremor began in right hand.

Sudden and chronic exposure and prolonged fatigue have also been considered as possible causes; here also the emotional effect should not be overlooked. One of our patients attributed his illness to exposure in the blizzard of 1888; another to a fall from a boat, he was in the water twenty minutes.

In twelve of the cases the assigned cause was an antecedent acute infectious disease; these included typhoid fever, pneumonia, grippe and malaria. Lannois has reported one case following measles; Fry, one after typhoid fever and influenza; Dana mentions as a possible causative element "a general toxic influence of endogenous origin."

Syphilis was admitted in only two of our cases; two cases following syphilis are reported by Oppenheim.

It is clear that we are far from solving the real etiology of the disease. It is noteworthy, however, that of the factors which we have reviewed, all have in common a general weakening influence on the organism, and particularly on the nervous system. Prolonged emotion, traumatism, acute and chronic disease, alcoholism and other toxines, exposure and overwork have in this sense a settled and unquestioned influence. Further than this, for the present, at least, we cannot postulate their casual relationship.

SYMPTOMS.

Tremor was the symptom which was first noticed by most of our patients, and for which they applied for treatment; it was observed in 203 cases of 207 in which a record was kept of this symptom. In four instances tremor was absent. With few exceptions, the determination of the part of the body in which the tremor first appeared depended upon the statement of the patient, since, as a rule, the tremor had extended to some other part before the patient came under observation. The part in which the tremor first appeared was as follows:

Part first affected		Male	Female	Total
Hand	right	33	24	57
	left	34	15	49
	both	14	2	16
Arms	right	7	9	16
	left	8	5	13
	both	4	2	6
Foot	right	3	1	4
	left	1	2	3
	both	1	1	2
Leg	right	4	4	8
	left	3	2	5
	both	1	—	1
Arm and leg	right	4	1	5
Arm and leg	left	2	1	3
Head		3	2	5
Head and both hands		—	1	1
General		1	4	5
Absent		3	1	4
Unrecorded		13	3	16
Total		139	80	219

The patient usually made the statement that the tremor commenced in the hand or foot; but in several of our cases they were quite clear in indicating the digit in which the tremor began. In one the tremor first appeared in the thumb of the right hand; in two in the thumb of the left hand, and in another in the index finger of the left hand.

The onset of the tremor was seven times as frequent in the upper extremity as in the lower:

	Upper Extremity	Lower Extremity
Male	100	13
Female	57	10
Total	157	23

and somewhat more frequent upon the right side of the body:

	Right Side	Left Side
Female	39	25
Male	51	48
Total	90	73

In three instances the tremor commenced in the head.

The rapidity of the extension of the tremor varies extremely. A number of cases showed an involvement of another extremity in a few weeks; while in many of the cases the tremor was confined to the part affected from one to three years. One instance, a night watchman began to have tremor in both hands when thirty years old; this was a classical case, with rigidity, retropulsion and lateropulsion; there was no extension of the tremor, however, for twelve years. In another case the tremor commenced in the left hand, and when first seen, two years after the onset, all four extremities were involved in the tremor; the patient said the tremor had become general in one year.

The extent of the tremor was as follows:

Limited to one Extremity	33	In arm 32, in leg 1.
One Extremity and Head	5	All in arms.
Diplegic	41	All in arms.
Diplegic and Head	14	All in arms.
Hemiplegic	27	Right side 12, left side 9, unrecorded 7.
Hemiplegic and Head	1	Began in arm 16, leg 5, unrecorded 7.
3 Extremities	18	Began in arm 17, in leg 6.
3 Extremities and Head	5	
4 Extremities	26	Began in arms 41, in legs 8, in head 3.
4 Extremities and Head	35	

To determine the order of the advance of the tremor, a further analysis was made of the cases in which three extremities were involved in the tremor. Seventeen of these began in the hand, six began in the leg. Of those beginning in the hand, the tremor next appeared in the leg of the same side in sixteen instances and then in the other arm; in one case it extended to the other arm and then to the leg of the side first affected. Of the six cases which commenced in the leg, in four it extended to the arm on the same side, and then to the other leg; in two cases the tremor next appeared in the other leg, and then in the arm of the side first affected. It would therefore appear that the advance was about equally divided between the diplegic and hemiplegic types.

Tremor was noted in the tongue in nine instances; in the lips in four cases; once at the angle of the mouth. Twice the tremor involved one-half of the face. In one case there were contractions of the muscles of the neck, causing a rotary movement of the head. In another the tremor assumed the form of a slight pronation and supination of the right hand and forearm. In two cases the tremor was intentional in character; both were otherwise typical cases of paralysis agitans; one of these had existed eight years. Tremors of this character have also been recorded by Gerhardt. Ordinarily voluntary motion diminishes the amplitude of the tremor rather than abolishing it; as has been pointed out by Féré, this is proved by graphic tracings of the tremors.

In one case a male telegrapher, forty-five years old, was frightened by a flash of lightning; tremor followed immediately "in the left eyeball," then it extended to the eyelids of the same eye; later to the left upper extremity, and gradually became general. Instances of tremor of the orbicularis palpebrum have also been reported by Gowers and Wollenburg.

Rigidity was observed in 142 cases; in 138 of these tremor was also present; in four tremor was absent. Tremor had existed for periods from eight to ten years in several of our cases before the appearance of rigidity. The four cases without tremor all were clear cases of paralysis agitans; one of these had existed for one year, and was watched subsequently for ten months without the appearance of any tremor. Schlapp and others have reported cases without tremor.

In sixty-five cases tremor was present, but no rigidity. Swallowing was difficult in only one case.

Contractures were noted in twenty-eight cases.

The *tendency of the patients to fall* was carefully examined into in 173 instances; it was absent in sixty-eight cases, present in 105. The number and direction of this tendency were as follows:

Latero-pulsion	6 cases	Pro- and Retro-pulsion.....	6 cases
Retro-pulsion	11 “	Pro- and Latero-pulsion.....	5 ”
Propulsion	71 “	Retro-Pró-and Lateropulsion.	3 ”

On analyzing the series to find out whether the direction of the tendency to fall was dependent upon the presence of the tremor in corresponding parts and a consequent muscular weakness, it was found that there was no association of this kind existing between these symptoms. In three cases in which there was no tremor there was marked propulsion. In one, in which there was lateropulsion to the right, tremor was present in the left arm only, while in one left lateropulsion the tremor was entirely on the right side of the body. In four others with lateropulsion the tremor was general.

The *deep reflexes* were investigated in 188 of the series; of these, ninety were normal; in thirty they were present, but diminished, and in sixty-eight they were more active than normal. In three instances there was a distinct and typical clonus of one foot; in two of these the knee-jerks were active, but not greatly increased; in one case a woman of forty, with tremor in four extremities, more evident on the left side, there was a great increase of both knee-jerks and a typical clonus of the left foot. Often the knee-jerks were unequal, the increased knee-jerk being sometimes on the side most involved in the tremor and again on the side least involved.

Argyll-Robertson pupils were present in two, otherwise typical cases.

There were definite *voice changes* noted in 120 cases. These were described as monotonous in fifty-nine, slow and measured in thirty-one, piping in twelve, feeble, weak or indistinct in fifteen, thick in ten, hesitating in seven, and in several others as hoarse, jerky, tremulous, etc.

Pain when present was, as a rule, not severe. The patients described them as "aching," "dull," "shifting," or "slight darting pains;" usually when present they corresponded with the part in which the tremor was most evident. A certain number complained of pain in the extremity preceding the onset of the first tremor. In two cases the patients complained of pain in the calves of the legs, while the tremor was limited to the arms; in both of these cases tremor soon afterward appeared in the legs.

The distribution of pain was:

General	16 cases	Arms	31 cases
Legs	20 "	Hands	6 "
Head	9 "	Back	7 "
Abdomen	1 case	Absent	87 "

Paresthesias of various kinds were present in 120 cases; these were sensations of "pricking," "numbness," "tingling," "flushing," "heat and cold;" usually the sensation was very transitory and passed quickly from one part of the body to another. By far the most common subjective sensory disturbance was the feeling of heat or cold; these were often localized in the part where the tremor was most evident, but frequently in a part free from tremor.

The distribution of these sensations was as follows:

Sensation of Heat		Sensation of Cold		Sensations Of Heat and Cold.	
Feet	5	Feet	1	Arm	3
Body	3	Body	1	Unspecified	17
Abdomen	1	Back	1		—
Shoulder	1	Arms	1	Total	20
General	1	Hands	6		
Right side	1	Legs	3		
Unspecified	19	Unspecified	7		
	—		—		
Total	31	Total	20		

Hyperidrosis was complained of in fifty-seven instances; in the hands, three; body, one; head, two; neck, one; left side, one; head and back, one; feet, one; general five; not localized, forty-two. There was no definite association of the excessive sweating with the part most affected by the tremor or with the part in which the disease first became manifest.

In eighty-five cases *restlessness* was a marked feature.

In thirty of the patients the *pulse rate* was above 100; of these one had a distinct enlargement of the thyroid gland; but the character of the tremor, gait and attitude and the presence of rigidity lead us to classify it as a true case of paralysis agitans. In one instance, with a pulse rate of 120, there was an aortic regurgitation, with a fairly well compensated heart. The highest pulse rate was 132.

Complications were met with as follows: Digestive disturbances, seven; rheumatism, three; alcoholism, one; neurasthenia, two; trophic disturbances, one; urinary disease, six; goiter, one; arthritis, one; hemiplegia, two; hernia, one; corneal ulcer, one.

These seem to have been coincident affections, which one might easily run across in examining any 219 patients of advanced years. Several of the cases are, however, of more than passing interest. The two cases complicated by hemiplegia were as follows:

A gardener, forty-three years old, had a left hemiplegia, from which he partly recovered; two years later he began to have a tremor of the left hand. When he was first examined at the clinic three years later he had the typical attitude and expression of paralysis agitans; there was a classic tremor of both arms, with rigidity of both arms and legs. The deep reflexes were present but not increased. Remnants of his old hemiplegia were present.

A married female, fifty-seven years old, began to have a tremor of the right hand at the age of forty-seven; the tremor extended to the right side of the face, and the voice changed to a slow monotone. At fifty-two she had a complete right hemiplegia, with aphasia, from which she gradually recovered. At the time of her examination the attitude was that of a classic paralysis agitans; there was tremor of the right hand and right side of the face; the voice was slow and monotonous; there was weakness of the right arm and right leg; the deep reflexes were all lively; there was partial anesthesia of the right hand; the right leg was somewhat hypersensitive; the heart was rapid; she suffered from dyspnea on exertion. She passed large quantities of urine of a low specific gravity, containing no albumin, sugar or casts. She assured me that the tremor had not changed since her attack of hemiplegia.

Another case of interest was a woman of sixty years, who had suffered from a typical attack of paralysis agitans for six years;

tremor and rigidity were present in both arms and one leg. Of late she had been troubled by the brittleness of her finger nails; both hands were red, puffy and painful to the touch. There were no changes in the heart or blood vessels that could be discovered. This patient was seen but once.

TREATMENT.

The difficulties attending the treatment of cases of shaking palsy are multiplied by the impossibility of removing the average dispensary patient from his environment of emotional distress and physical deprivation. The improvement observed was mainly in those who had comfortable homes and relatives sufficiently capable and interested to free them from the stress of daily toil, worry and excitement. We can report no absolute cures, but in a number of instances the disease came to a standstill and remained so a number of years, while many times it seemed evident that the treatment employed materially modified the symptoms, such as the tremor and insomnia rendering the patient's life far more comfortable and happy.

Every effort was made to remove sources of anxiety and worry; exhausting and laborious occupations were, when possible, replaced by light, quiet work with short hours. A diet of simple, nutritious food was advised, while alcoholic drinks, tea and coffee were usually forbidden. The effort was made in each case to improve the general nutrition and strength of the individual. Moderate exercise was often found of considerable value; light occupations, like reading and sewing, often afforded an increase in the mental control so useful in a certain number of cases. Of far greater value was the systematic use of massage, passive movements and hydrotherapy; these were rarely obtainable for our patients in a sufficiently extensive and systematic manner, but in a certain number of instances massage was given at the clinic twice a week, with hydrotherapeutic measures on the other days; these cases often showed for a considerable period a marked improvement. In a number of cases electricity in various forms and by various methods was administered, but with no noticeable benefit.

Most of the drugs suggested by various authorities have been used from time to time. None of these have consistently proved beneficial. Those which have proved of most value have been the hydrobromate of hyoscine and the sulphate of duboisine; these quite regularly, for a time at least, diminished the tremor and relieved insomnia. General tonics, particularly iron and strychnine, have been of considerable service.

I wish to acknowledge Professor Starr's kindness in allowing me to make use of the clinical material.

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